

Today's Biopower



Much of our planet teems with vegetation. Trees, grasses, flowers, weeds, and seaweeds—if it grows, it's biomass. And biomass has inherent energy that can be converted to power. In simple form, humans have been using and benefiting from biomass power for thousands of years.

These days, we're miles beyond using biomass power only to heat dwellings and cook food. We're even beyond using simple combustion of biomass to make steam to produce electricity.

Now, we're generating electricity by cofiring biomass with fossil fuels—which helps to clean up emissions. Using biomass fuels also helps the environment by reclaiming residue materials (such as from forestry or agriculture) that would otherwise contribute to burgeoning landfills.

Now we're using biomass to make biogas, which concentrates its energy content and converts it to a substance that's broadly usable in a variety of applications. And we're doing this with greater and greater efficiency—capturing more of the energy—all the time.

Now we're beginning to plant thousands of acres of marginal land with fast-growing grasses and trees for use as energy stocks to feed power plants. These energy crops anchor the soil and protect against erosion because they stay in the ground from 5 to 30 years. In the growth phase, they absorb carbon dioxide, a potent greenhouse gas implicated in global warming, in equal measure to the amount released later during energy conversion.

And now we're working with a broad-based biomass constituency, a group of dedicated individuals at companies within the private sector joining forces with like-minded people in local, state, and national government to share the risks and rewards that come with taking new energy technologies from the research laboratory to the field.

In 1991, the U.S. Department of Energy (DOE) chartered the National Biomass Power Program with just these goals in mind.

The Biopower Program

The original goal of the Biomass Power Program remains the same—to help establish a sustainable option to contribute to the 600 gigawatts of new electric generating capacity projected to be needed globally over the next 10 years. The program revolves around investigating promising technology pathways, working with industry to scale up the most promising ones, and finding ways to continually pare down the costs of biomass power as it drops ever closer to competitiveness with fossil fuel power.

Specifically, the program is engaged in the following activities:

Technology Change

- Cost-share first-of-a-kind cofiring demonstrations.
- Support efforts to develop gasification technologies for multiple uses.
- Support development of advanced conversion technologies.
- Seek innovation in technology via the Small Business Innovative Research program and through a new University Biomass Research program.

Environmental Values

- Assess the environmental benefits of biomass power production, crop production and residue utilization.
- Disseminate assessment results to policy makers, the public, regulators, environmental organizations and other stakeholders so that biomass may be recognized as a sustainable, environmentally-beneficial source of energy.



Daniel Peck / PIX05085

Dedicated crops of fast-growing trees, like these willows, can be mechanically harvested every three years for a ready supply of biomass to generate electricity.

BIOWATER PROGRAM

- Determine and disseminate information on the links between incentives for biopower production and improvements in air, water quality, soil conservation, nutrient management, and the rural economy.

Outreach and Information

- Support a variety of forums for stakeholders to exchange information directly or indirectly associated with biomass.
- Continue and expand education efforts to acquaint the general public, electricity providers, regulators, the media and funding organizations with the benefits and other issues surrounding biopower including sustainability, biodiversity, air and water emissions, and economic development.
- Support and encourage partnerships among stakeholders in government and the private sector.

A Natural Advantage

As noted earlier, biomass fuels “take care of themselves” with regard to carbon dioxide emissions and produce virtually no sulphur emissions, which helps to mitigate acid rain. They also have numerous other natural advantages over fossil fuels. Fossil fuels are a finite resource. Biomass is constantly being replenished. It lends itself to harvesting in a sustainable way.

Biomass power has a natural economic advantage, too. Most regions of the United States are well endowed with the resources for biomass power, or have ample land available to plant to energy crops. Developing, harvesting, and using these biomass resources builds up the region's economic base, rather than depleting the economy by importing energy supplies. Powering up with local resources and workers powers up the local economy at the same time.

Beyond this, developing and commercializing these biomass feedstock systems and conversion technologies gives the United States something to proudly—and profitably—export to the world.

A Major Renewable Generation Resource

Today, biomass is a major renewable generation resource with almost 7,000 megawatts of capacity nationally, from a diverse range of producers including the pulp and paper industry, electric utilities, and independent power producers. The U.S. biomass power industry represents an investment base of \$15 billion and supports about 66,000 jobs. But biomass generating capacity has been declining in recent years due in part to increasing pressures brought about by utility restructuring. This is especially unfortunately since the biopower industry provides many un-monetized benefits such as avoided air emissions and landfilling. Biopower also



Warren Gretz, NREL / PIX04744

The Battelle gasifier in Burlington, Vermont, provides a clean gas fuel for modern power systems that can achieve efficiencies double those of today's biopower industry.

offers cost-effective near-term opportunities to reduce emissions of all types and increase industrial efficiency. While there are new market opportunities such as green power, the substantial and diverse benefits of biopower are not universally recognized at this time. The DOE biopower program is working to overcome these technical and institutional barriers so that biomass can continue to be a valuable component of our nation's energy profile.

Building toward a future of clean energy, bridging the gap from here to there, frames the work of the Biomass Power Program. One vision for this cleaner, better future shows biomass power as an everyday commodity—a workhorse in the world of electricity production. It's a time when a farmer has acreage planted to a range of crops, including those for both food and energy, with stable markets for every bit of plant material that's produced and nothing left over for the landfill. It's a time when the clean efficiency of biomass power is lighting the way in communities across the nation and around the world.

For More Information:

Visit the BioPower Web site:

<http://www.eren.doe.gov/biopower>

For copies of print documents on renewable energy, call DOE's Energy Efficiency and Renewable Energy Clearinghouse (EREC) 1-800-DOE-EREC (1-800-363-3732)



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